Lake Michigan Regional CHP Workshop

CHP: Market Overview

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Chicago, IL

John Brogan

ONSITE SYCOM Energy Corporation

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- Largest independent, nationally accredited Energy Service Company (ESCO)
- Full service offering with international presence
- Company origins in cogeneration and on-site power generation
- Active in distributed generation and combined heat and power

Why the Renewed Interest in CHP?

- Restructuring is opening access to the electric grid system
- Customers have greater awareness of energy costs and options
- Technology improvements enhancing performance & economics
- ESCOs & ESPs opening path to market
- Federal and state government taking action

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The National Perspective

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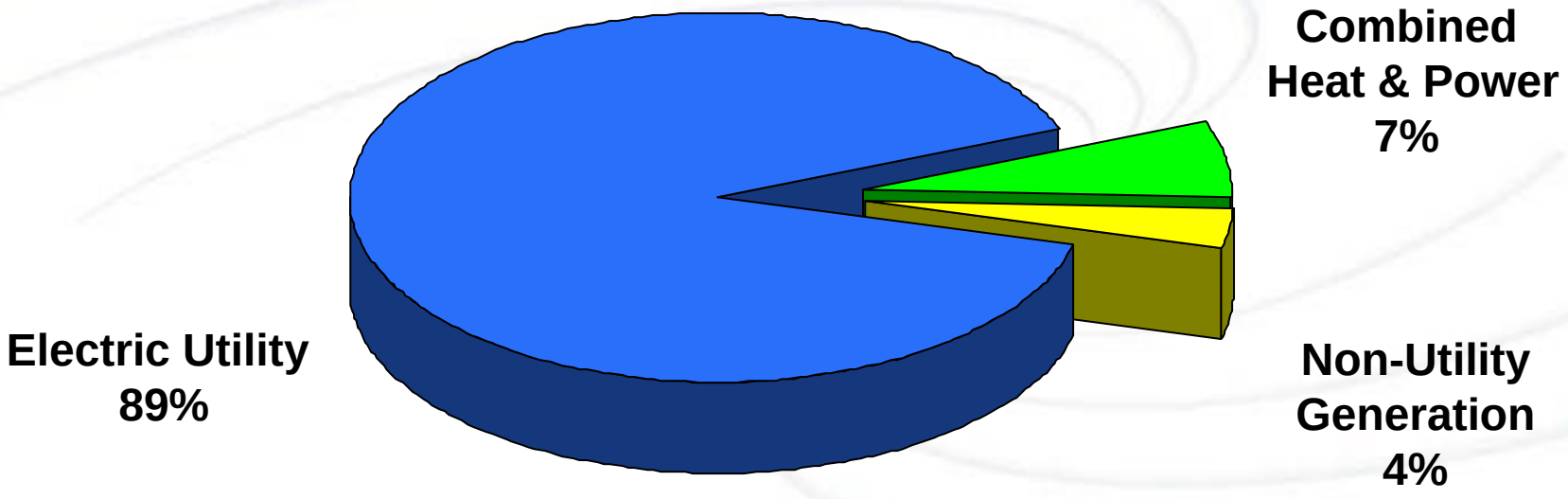
CHP Is Already an Important Power Source

- Total Electric Generating Capacity (1995)
  - 750,859 MW



Source: EEA, 1998

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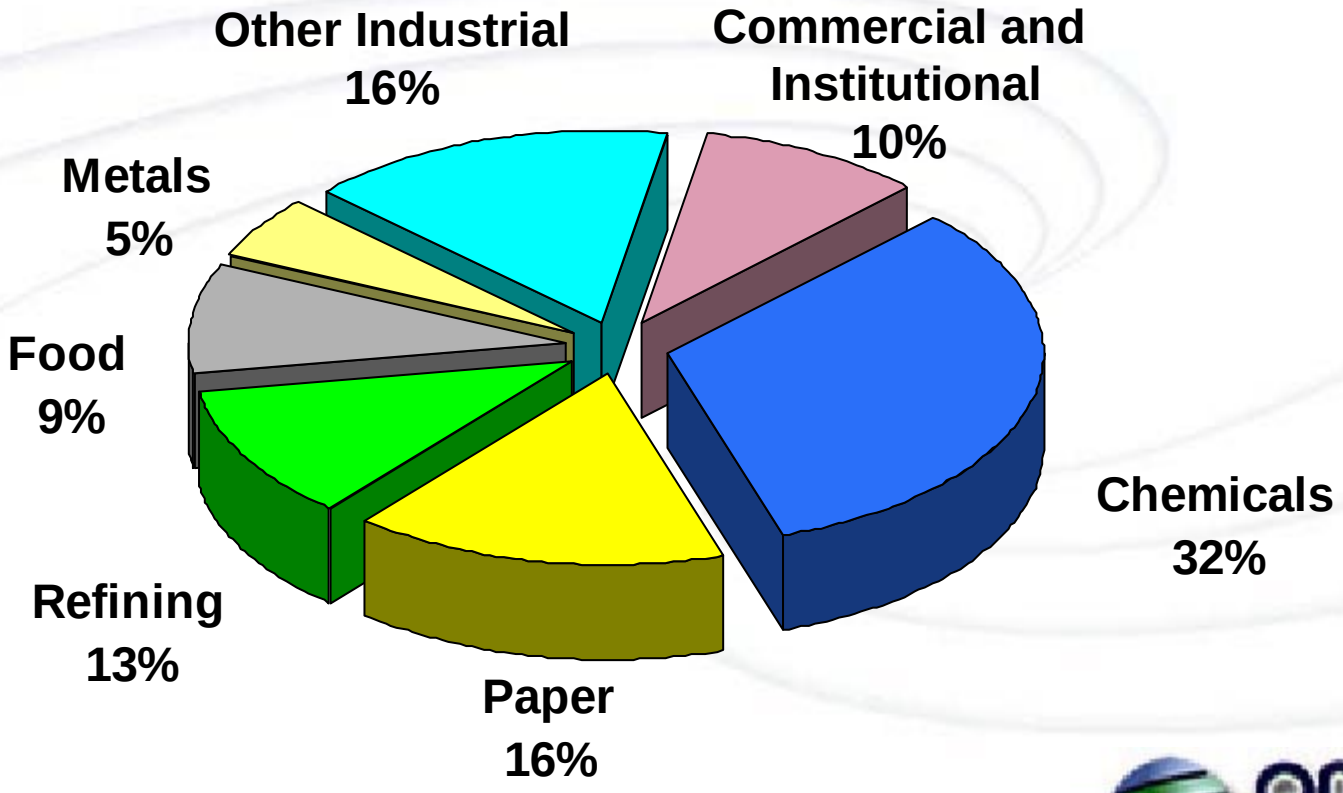
Most Existing CHP is Located at Industrial Sites

- Estimated CHP Capacity (1999) 50,400 MW



Source: Hagler Bailly

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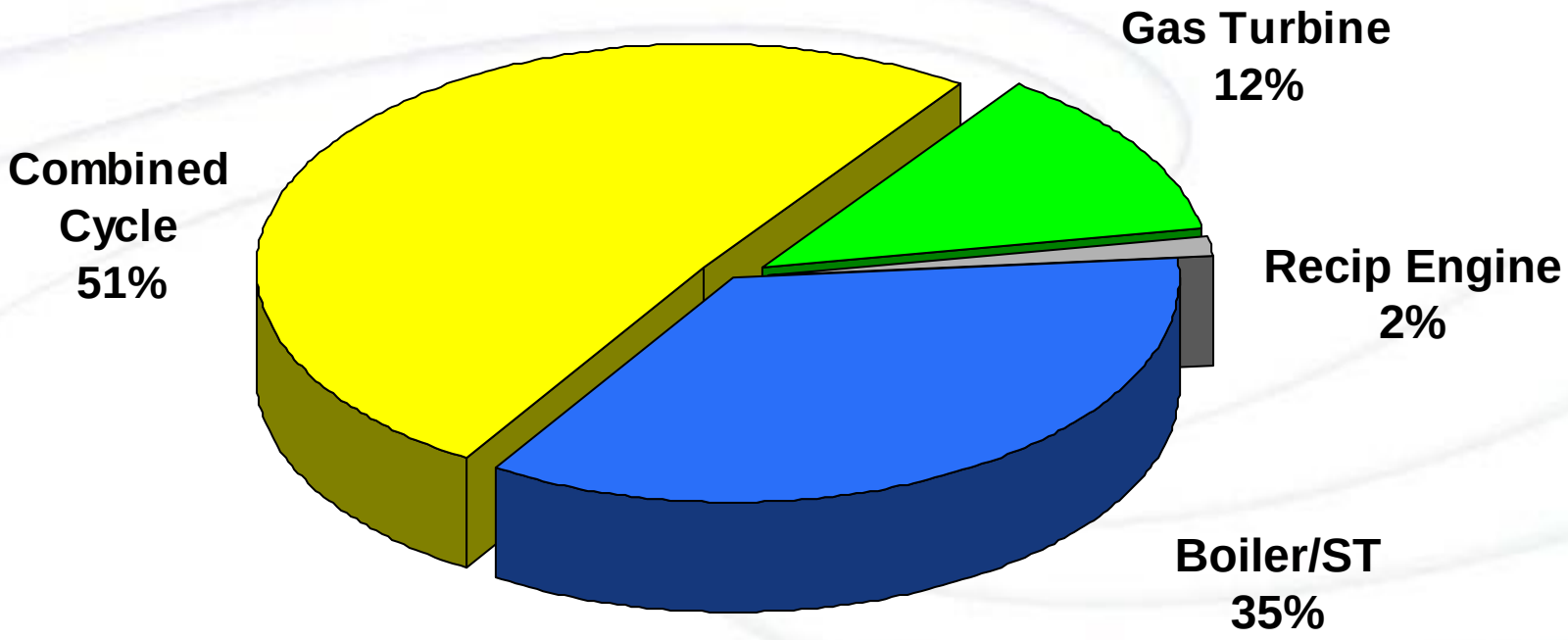
Gas Turbines Dominate Capacity

- Estimated CHP Capacity: 50 GW



Source: Hagler Bailly, 1999

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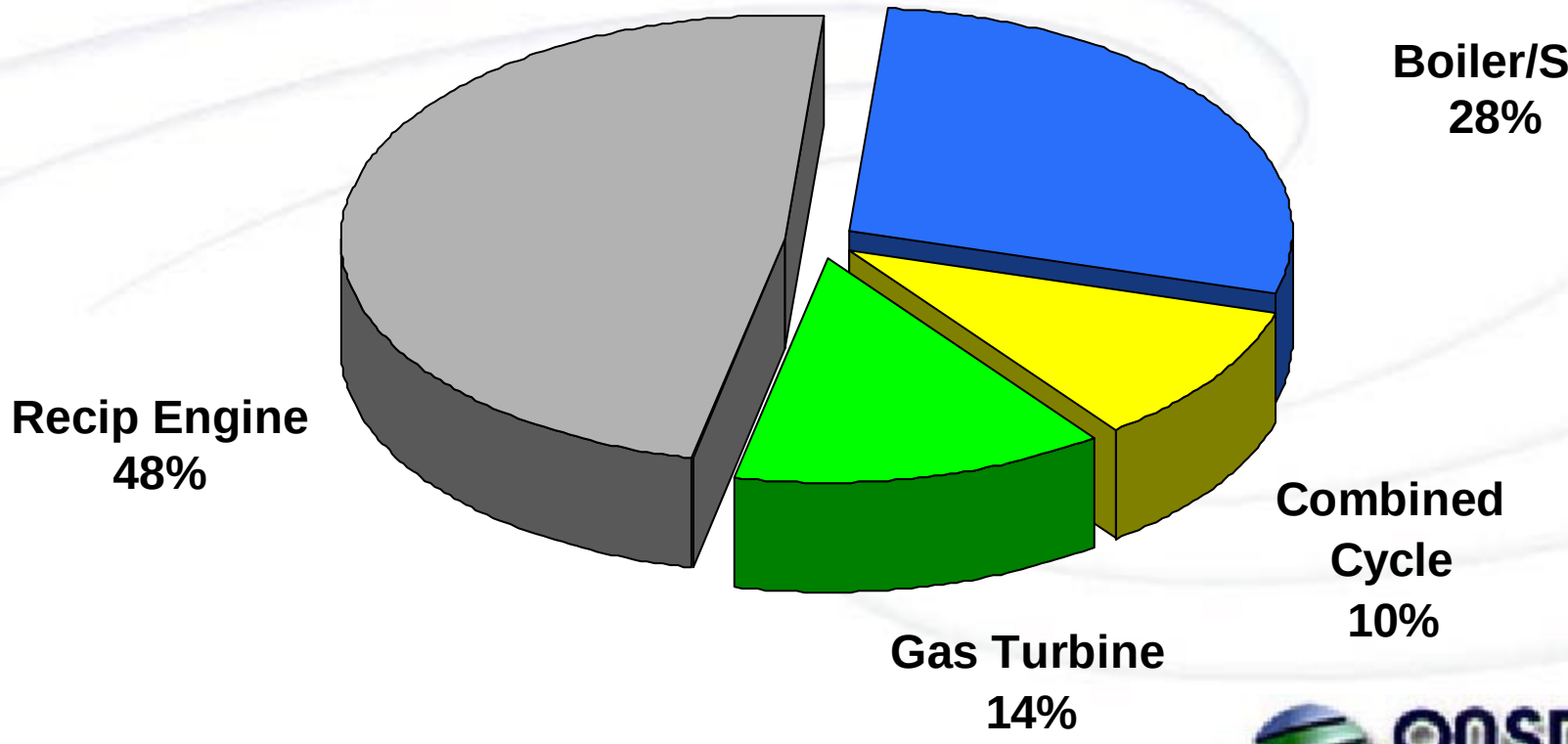
Almost Half of Existing CHP Sites Are Engine Driven

- Estimated Number of CHP Sites: 2028



Source: Hagler Bailly, 1999

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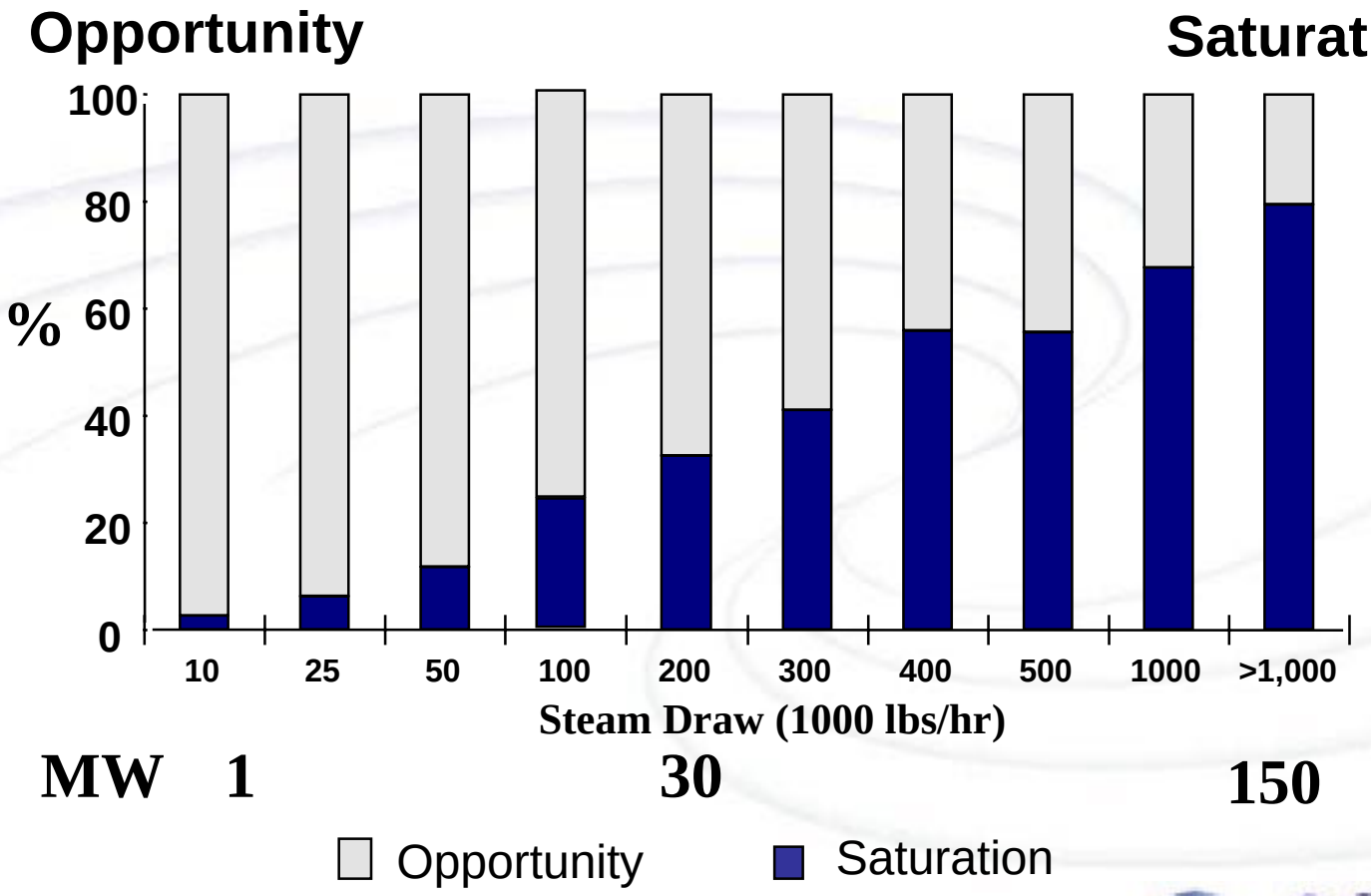
Are There Additional Opportunities for CHP?

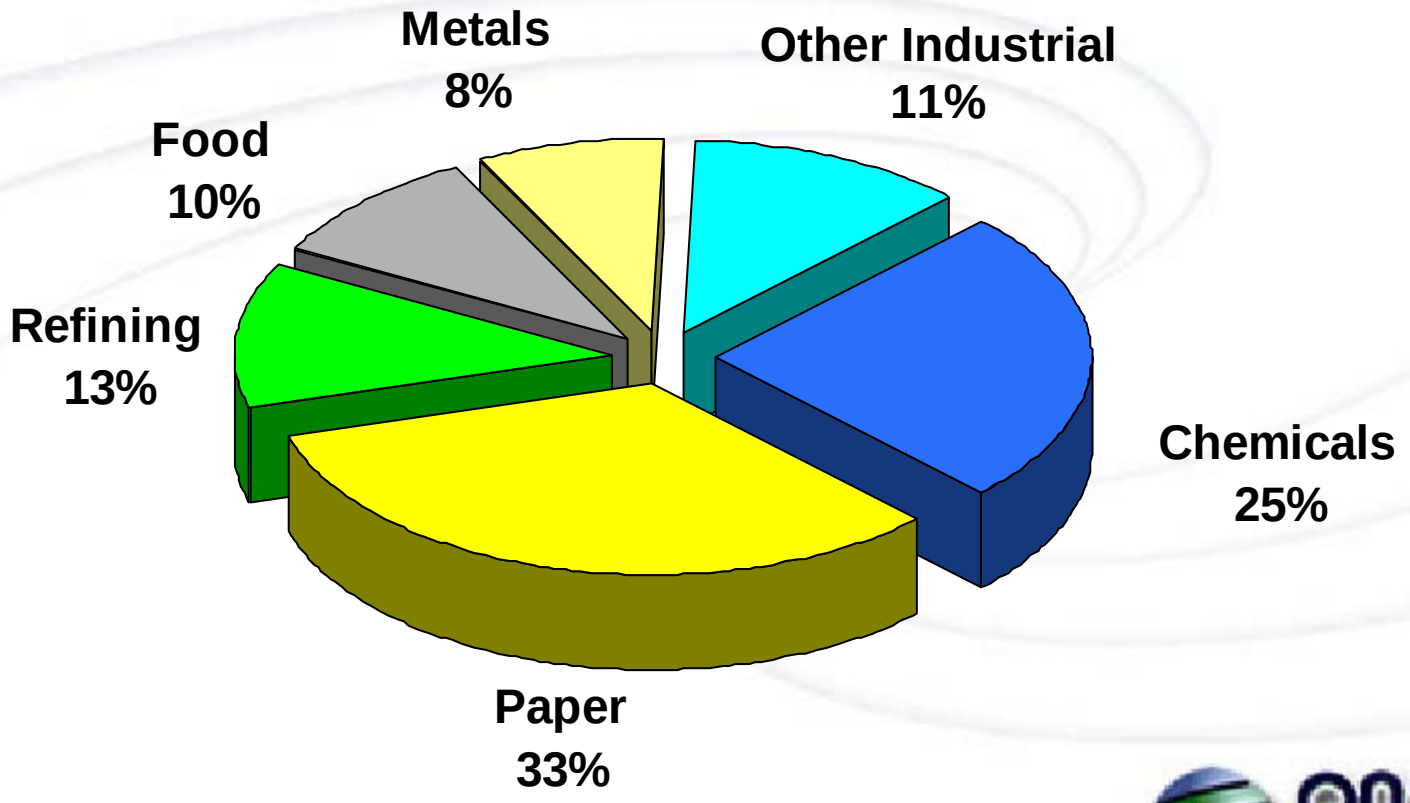


Source: General Electric

Energy Corporation

The Remaining Opportunities for Industrial CHP Are Large

- Estimated CHP Potential: 100 GW



Source: ONSITE SYCOM 1999 (preliminary)

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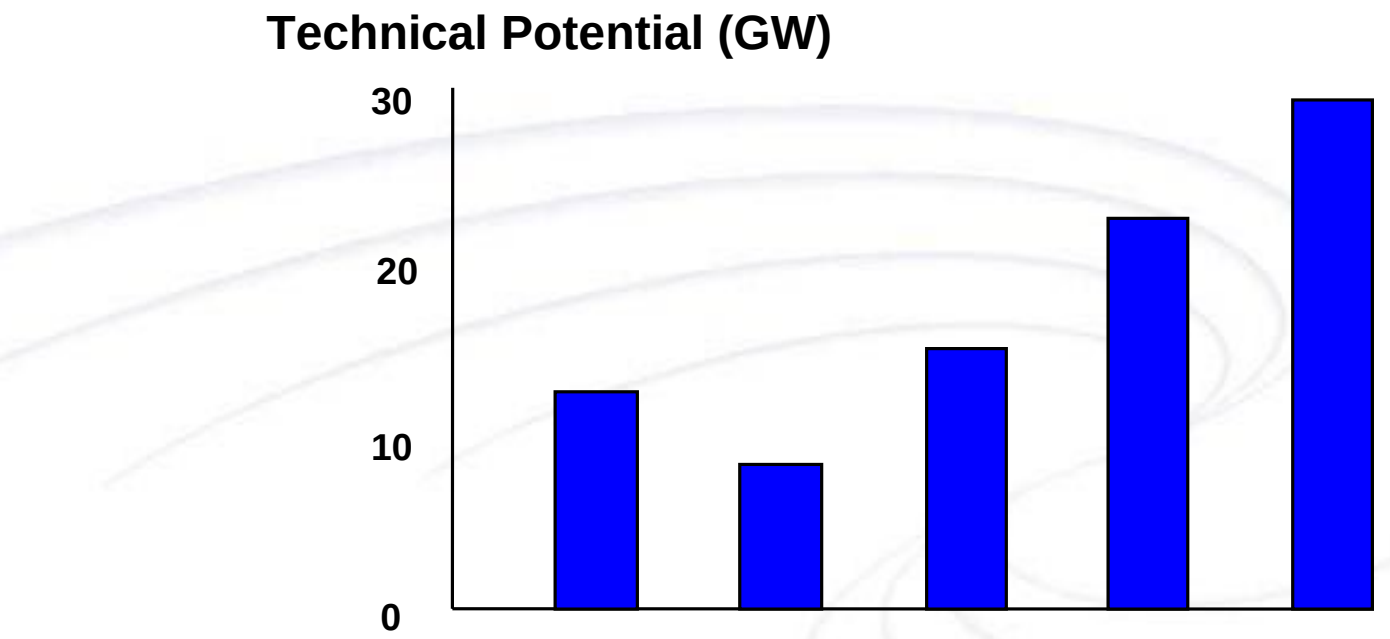
Industrial CHP Potential



Source: Onsite Energy

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Industrial CHP Potential

- Potential for 100 GW of additional CHP in manufacturing industries
- CHP could save users $10 billion/year in energy costs and prevent the release of almost 70 million metric tons of carbon equivalent
- 10% of potential is in size range of recip engines and microturbines
- Additional potential in non-steam CHP and mechanical drive

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Typical Commercial CHP Applications

Application	*Average Electric Demand (W/sq ft)*	*Electric/Thermal Energy Ratio*
Education	**1-2**	**0.7**
Health Care	**3-4**	**0.9**
Lodging	**2-3**	**0.9**
Food Service	**5-6**	**2.8**
Office Buildings	**3-5**	**2.6**
Food Sales	**8-9**	**10.6**
Apartments	**0.7 kW/unit**	**0.8**

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CHP Potential in the Commercial & Institutional Markets Is Largely Untapped

- Estimated CHP Potential: 60GW

Generation Capacity	50-250 kW	250-1000kW	>1000 kW
	Buildings (x1000)		
All Commercial/Institutional Buildings	339	142	26
CHP Target Buildings			
Food Service	38	5	0
Health Care	15	5	3
Large Office (baseload)	23	9	2
Education	33	24	2
Lodging	24	12	2
Total CHP Target	133	55	9
Non-CHP Target	206	87	17

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What Are the Opportunities in the Lake Michigan Area?

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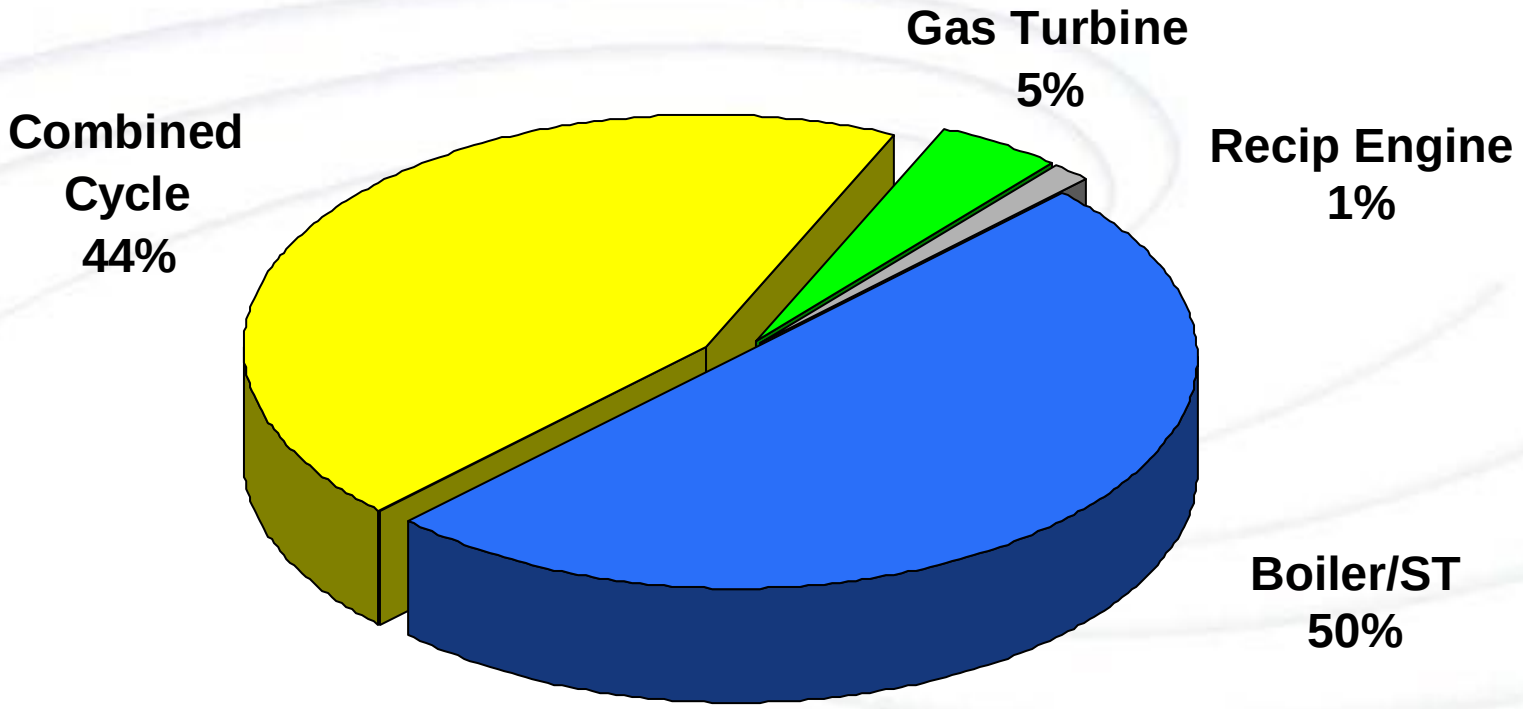
Combined Cycle and Steam Turbine Currently Dominate Lake Michigan CHP

- Estimated CHP Capacity: 4189 MW



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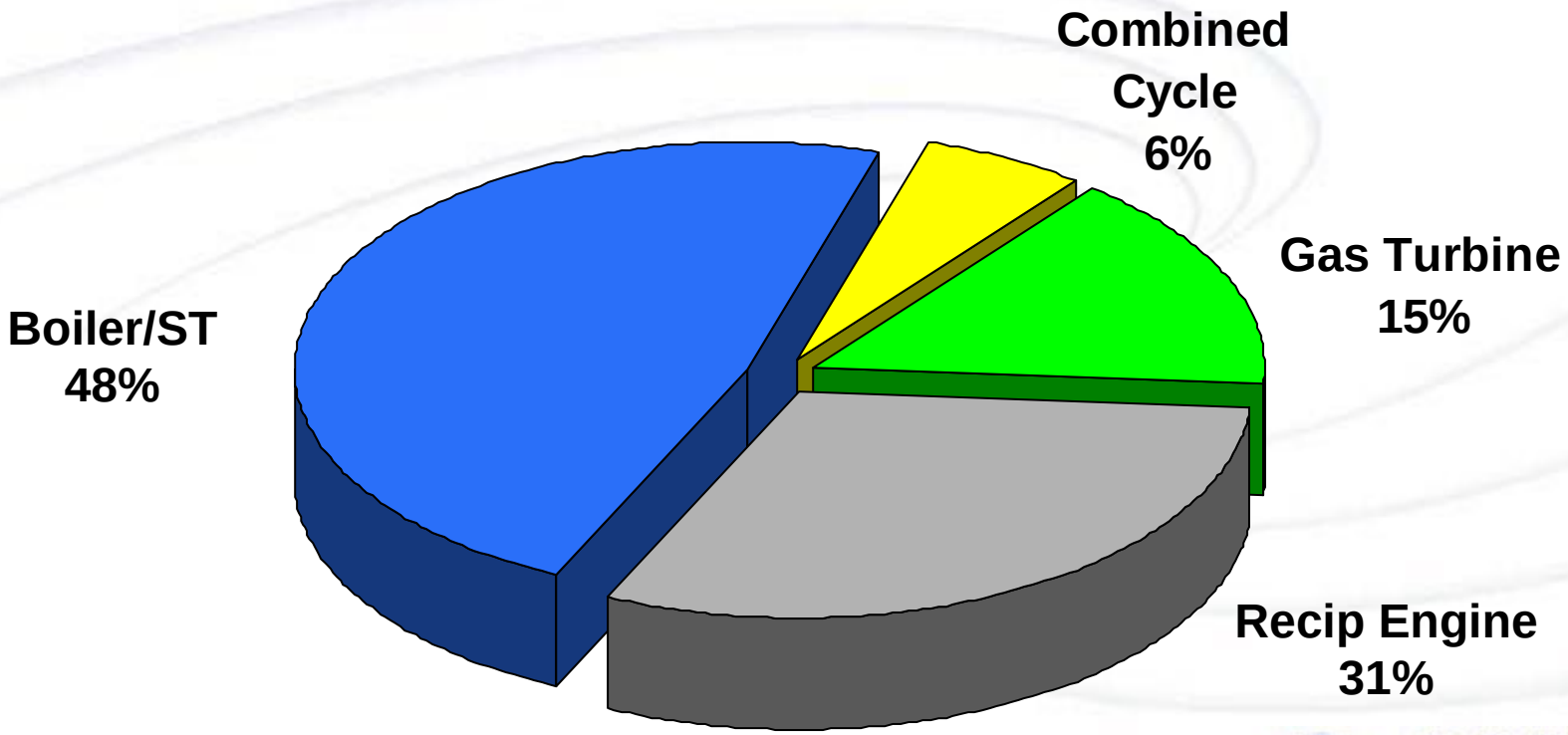
Almost Half of Existing CHP Sites Are Boiler / Steam Turbine Systems

- Estimated Number of CHP Sites: 149



Source: Hagler Bailly, 1999

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Potential CHP Applications in the Lake Michigan Area

	Average Demand, 500 kW - 5 MW	Average Demand, > 5 MW
Industrial Sites	**5,000**	**500**
Commercial and Institutional Sites	**2,700**	**30**

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The Future?

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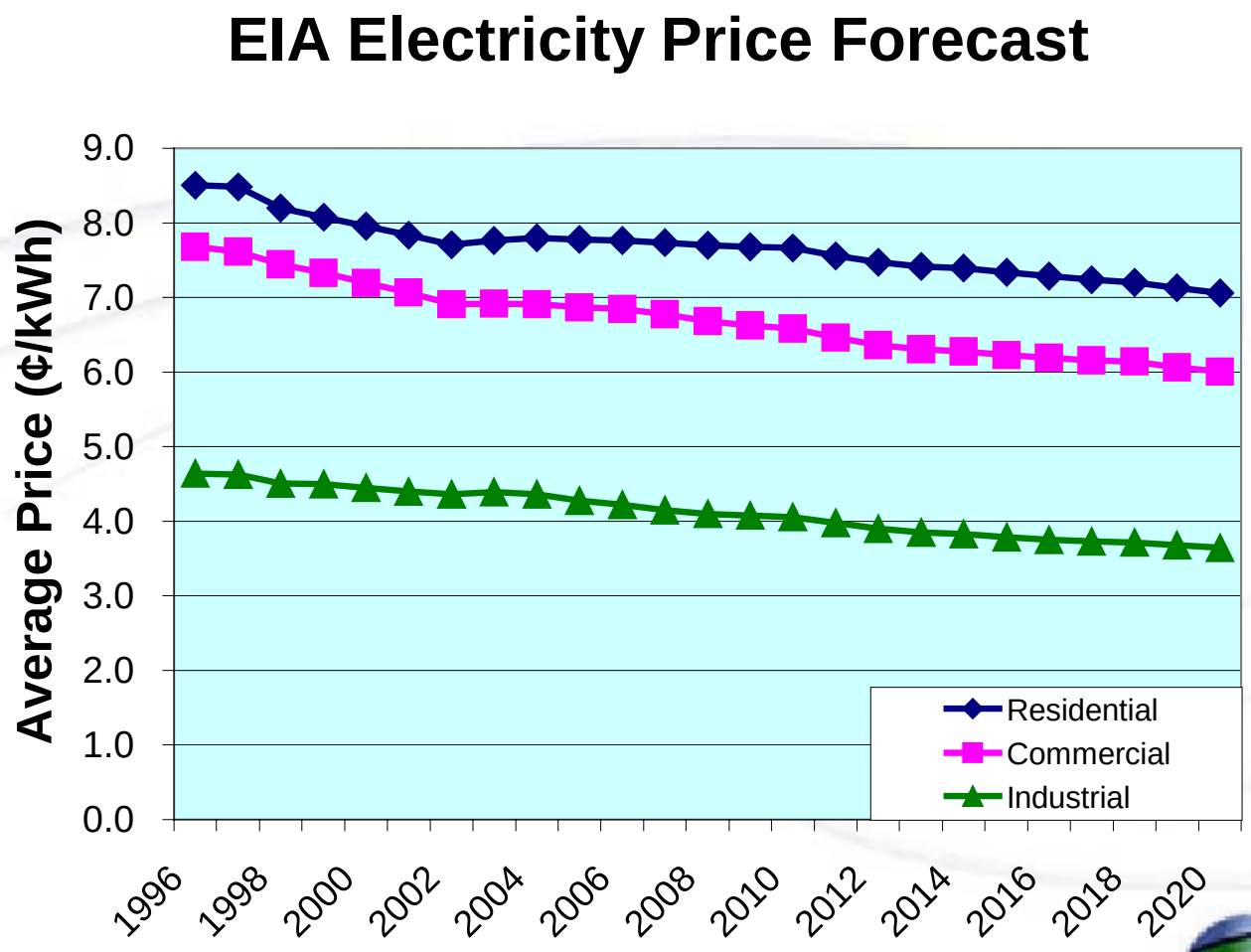
Future Electric Rates Will Be Lower



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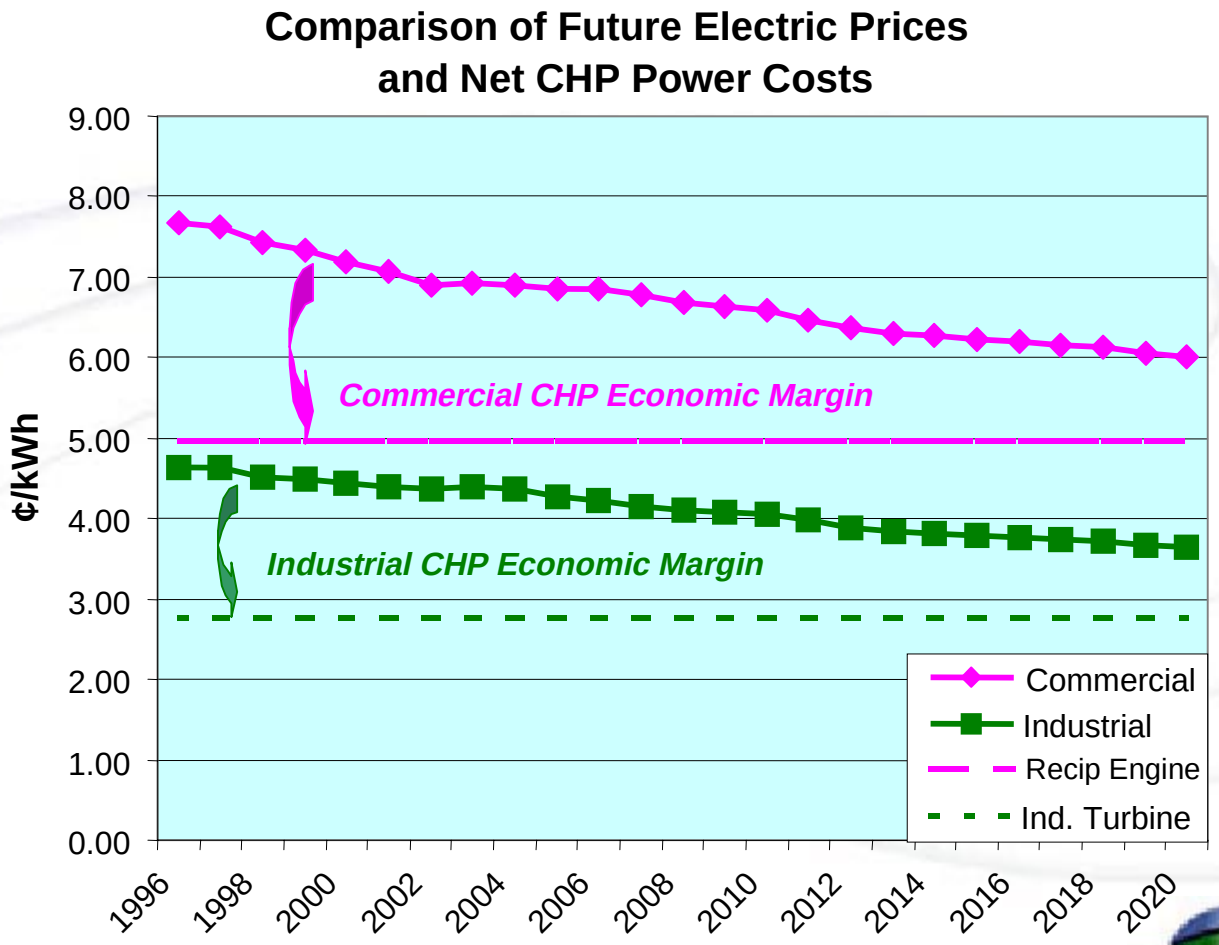
Economic Margins for CHP Will Remain: *Comparison to National Average Prices*



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Market Constraints to CHP

- Deferral rates and practices by utilities
- High standby / back up power costs
- Overly strict interconnect requirements
- Environmental Restrictions

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Market Constraints to CHP

- Siting and permitting delays / uncertainties
- Customer reluctance
- Lack of incentives in non-owner occupied buildings
- Poor load factors in many commercial sites

Market Constraints to CHP

- High equipment costs
- High engineering costs
- High transaction costs
- Higher than expected O&M costs

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